CLAIMS

What is claimed is:

1. A space-time signal constellation for use in a multiple-input/multiple-output (MIMO) communication system, embodied in or on a storage media, comprising:

a plurality of constellation points disposed among *n* real dimensions, wherein each said point lies within one and only one of at least two *n*-1 real dimensional sub-constellations, wherein *n*=2M and M is an integer greater than one.

2. The space-time signal constellation of claim 1 wherein M is equal to a number of transmit antennas in a MIMO system.

3. The space-time signal constellation of claim 1 wherein M=2.

4. The space-time signal constellation of claim 1 wherein each sub-constellation defines a *n*-1 dimensional plane, and said plane disposed parallel to one another.

5. The space-time signal constellation of claim 1 wherein the plurality of points are disposed about an arcuate surface and the plurality of sub-constellations comprise at least one pair of sub-constellations each defining *x* points, each said sub-constellation defining *x* points being disposed such that an origin of the constellation lies along an axis of symmetry defined by said pair.

6. The space-time signal constellation of claim 5 wherein the plurality of sub-constellations further comprises an additional sub-constellation defining *y* points disposed symmetrically about the origin of the constellation, and wherein no other sub-constellation has at least y points.

7. The space-time signal constellation of claim 1 wherein the plurality of points are disposed among K subsets, wherein the points of each subset are disposed among *n* real dimensions and wherein each point of a subset lies within one and only one of at least two *n*-1 dimensional sub-constellations, wherein K is an integer greater than one.

8. The space-time signal constellation of claim 7 wherein the subsets each define a closed arcuate surface.

9. The space-time signal constellation of claim 8 wherein the closed arcuate surface defines a sphere.

10. The signal constellation of claim 9 wherein the spheres are concentric.

11. The space-time signal constellation of claim 7 wherein a closest distance between points of adjacent subsets is defined by a maximized minimum Kullback-Leibler distance.

12. The space-time signal constellation of claim 1 embodied in or on at least one of an optical storage media, an electronic storage media, an opto-electronic storage media, and a magnetic storage media.

13. A symbol detection method for a receiver of a MIMO communication system comprising:

receiving a multipath signal from M transmit antennas, M being an integer greater than one;

obtaining a data sample as a function of the received multipath signal; and

fitting the data sample to at least one point of an *n*-dimensional real signal constellation, wherein *n*=2M.

14. The method of claim 13 wherein the signal constellation consists of a plurality of points disposed among K subsets, wherein each point of a subset is disposed among one and only one of at least two *n*-1 real dimensional sub-constellations, and wherein a minimum distance between a point of one subset and a point of an adjacent subset is defined by a maximized minimum Kullback-Leibler distance, wherein K is an integer at least equal to one.

15. The method of claim 14 wherein each subset defines a closed arcuate surface.

16. The method of claim 15 wherein each closed arcuate surface is a sphere and further wherein each sub-constellation defines a circle.

17. The method of claim 14 wherein the at least two sub-constellations of at least one of the K subsets comprise at least one pair of sub-constellations defining *x* points, each said sub-constellation defining *x* points being disposed such that an origin of the constellation lies along an axis of symmetry defined by said pair.

18. The method of claim 17 wherein at least one of the K subsets further comprises an additional sub-constellation defining *y* points disposed symmetrically about the origin of the constellation, and wherein no other sub-constellation has at least y points.

19. The method of claim 17 wherein each of the subsets comprise a said pair of sub-constellations defining *x* points.

20. The method of claim 14 wherein fitting the data sample to points comprises recursively comparing the data sample to points of a sub-constellation of a subset until the data sample is matched to a constellation point.

21. The method of claim 14 wherein fitting the data sample comprises selecting an *n* dimensional real signal constellation from among at least two stored signal constellations based on the determined number M of transmit antennas, wherein one of the at least two stored signal constellations defines *n*=2M real dimensions and another of the at least two stored signal constellations defines one of 2(M+1) and 2(M-1) real dimensions.

22. The method of claim 14 wherein fitting the data sample comprises determining one of a signal to noise ratio, a bit energy to noise power spectral density ratio, and a symbol energy to noise power spectral density ratio, and selecting an n dimensional real signal constellation based on the determined ratio.

23. A wireless communications system network element comprising storage means for storing a digital representation of at least one *n*-dimensional real signal constellation defining a plurality of points, wherein each and every said point lies within one and only one of at least two (*n*-1)-dimensional real sub-constellations, wherein *n*=2M and M is an integer greater than one.

24. The network element of claim 23 wherein the network element comprises at least one of a mobile station, a base station, a receiver symbol detector, and a symbol modulator.

25. The network element of claim 23 wherein each sub-constellation defines a *n*-1 dimensional plane, each plane disposed parallel to one another.

26. The network element of claim 23 wherein the at least two sub-constellations comprise at least one pair of sub-constellations each defining *x* points, each said sub-constellation defining *x* points being disposed such that an origin of the constellation lies along an axis of symmetry defined by said pair.

27. The network element of claim 23 wherein the plurality of points are disposed among K subsets each defining *n* real dimensions, wherein each point of a subset lies within one and only one of at least two *n*-1 dimensional sub-constellations, wherein K is an integer greater than one.

28. The network element of claim 27 wherein the subsets each define a closed arcuate surface.

29. The network element of claim 28 wherein the closed arcuate surface defines a sphere.

30. The network element of claim 29 wherein the spheres are concentric.

31. The network element of claim 27 wherein a closest distance between points of adjacent subsets is defined by a maximized minimum Kullback-Leibler distance.

32. The network element of claim 23 further comprising:

means for storing a digital representation of a 2(M+1)-dimensional real signal constellation defining a plurality of points, wherein each and every said point lies within one and only one of at least two (2M+1)-1 dimensional real sub-constellations;

a receiver for receiving a signal that includes noise;

means for determining a ratio of signal power to noise power; and

means for selecting one of the signal constellations based on the ratio.